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EXAMINER	
WANG, EUGENIA	
ART UNIT	PAPER NUMBER
1745	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/16/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/687,242	Applicant(s) BREAULT ET AL.	
	Examiner Eugenia Wang	Art Unit 1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-25 is/are pending in the application.

4a) Of the above claim(s) 7 and 16 is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-6, 8-15, 17-25 is/are rejected.

7)☒ Claim(s) 23-24 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. In response to the amendment received on February 12, 2007:

   a. Claims 7 and 16 have been cancelled as per Applicant's request. Claims 1-6, 8-15, and 17-25 are still pending.

   b. The previous claim objection has been withdrawn in light of the amendments.

   c. The previous prior art rejections of record have been withdrawn.

Claim Objections

2. Claims 23-24 are objected to because of the following informalities: they recite the loads of a transportation device and a stationary device (claims 23 and 24, respectively). However, claim 22, which claims 23-24 are dependent upon, is directed to a fuel cell power plant. Recitation of particular loads applied to the power plant of claim 22, such as those recited in claims 23 and 24 are not held to further limit the power plant of claim 22. Therefore, in so far as the claimed power plant is concerned, claims 23 and 24 fail to further define the claimed power plant. Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-3, 8-15, and 17-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6764786 (Morrow et al.) as evidence by "ZIRCAR Ceramics: ZAL-45 & ZAL-45AA" and <u>Handbook of Fuel Cells</u>.

Regarding claims 1, 22, and 25, Morrow et al. teaches a fuel cell stack [12] and power plant comprising a defined reaction portion [14] (column 4, lines 26-28). A component plate [16] is secured at the end of the reaction portion (column 4, lines 41-46). Additionally, Morrow et al. teaches a graphite current collector [24] that is electrically connected with the end cell (column 4, lines 66-68; column 5, lines 1-6). A

desired electrical conductivity for the current collector, 25 siemens/centimeter or greater, is mentioned (column 4, lines 62-64). Although conductivity is not mentioned in the claim, electrical resistivity is mentioned. However, it would be obvious to one having ordinary skill in the art to know that conductivity is the inverse of resistivity. A simple conversion, shows that the desired conductivity of the claimed current collector falls within the range that Morrow et al. teaches.

$$resistivity = \frac{1}{conductivity}$$
$$at\_Claim's\_boundary:$$
$$resistivity = 100\_mircro - ohm\_cm$$
$$conductivity = \frac{1}{100\_micro - ohm\_cm}$$
$$conductivity = \frac{1}{100 * 10^{-6}\_ohm\_cm}$$
$$conductivity = 10000\_siemens / cm \geq 25\_siemens / cm$$

In one embodiment, Morrow et al. also teaches an embodiment of their current collector, which includes a thin, highly conductive metal layer [39], for example copper, next to it (col. 5, lines 44-62; fig. 1). This thin, conductive metal layer [39] is said to be less than 2 mm thick (col. 5, lines 55-62), and it can be taken that this thin metal layer can be interpreted as a current collector itself. Because of the recitation of the high conductivity, it would be inherent that this metal layer [39] would have a conductivity as high, or even higher than the current collector [24]. Morrow et al. also teaches an insulator [36], which is placed next to the current collector (column 5, lines 27-28). Further regarding the insulator, Morrow et al. teaches its purpose, which is restricting of heat from the fuel stack though the current collectors (column 5, lines 35-38).

Therefore, it is inherent that total heat transfer rate across the insulator from the end cell being no greater than the heat generated by the end cell. Morrow et al. also teaches pressure plate [40], which is secured adjacent to the thermal insulator [36], which has the cross sectional area at least as large as the end cell component plate (column 5, lines 62-67). Additionally, the fuel cell apparatus above inherently includes a method of making and operating (as applied to claim 25). Morrow et al. teaches that the fuel cell has reactant manifolds [44, 46] secured to reaction portion [14] for directing the reactant streams into the fuel cell stack [10] (col. 6, lines 31-40) (as applied to claim 25).

Morrow et al. does not expressly disclose that (a) the current collector is thinner than 1 mm, (b) the insulator is thinner than 20 mm, (c) the thermal conductivity of the insulator is less than 0.100 W/mK, or (d) that the method would rapidly warm the fuel cell (as required by claim 25). However, the evidence and explanations below will obviate the aforementioned properties.

With regards to (a), as stated above the thin, conductive metal layer [39], said to be less than 2 mm thick (col. 5, lines 55-62), can be taken that this thin metal layer can be interpreted as a current collector itself. In can be reasonably stated that 2 mm or less would teach 1 mm or less, as the incremental decrease from 2 mm would be to 1 mm. Alternately, it can be interpreted that less than 2 mm does not fully encompass 1 mm or less, as required by claims 1, 22, and 25. If using this interpretation - it has been held that when the difference between a claimed invention and the prior art is the range or value of a particular variable, then a prima facie rejection is properly established when the difference in the range or value is minor. Titanium Metals Corp. of Am. v.

Banner, 778 F.2d 775, 783, 227 USPQ 773, 779 (Fed. Cir. 1985). Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969).

With regards to (b), Morrow et al. does not specifically mention the insulator [36] thickness. Although the figure is not drawn to scale, it is reasonable to say that insulator [36] would be less than the claimed 20 mm. This conclusion can be drawn since the metal layer [39] has been defined to be less than 2 mm thick (col. 5, lines 55-62) and the current collector [24] is defined to be 3-12 mm (col. 4, lines 60-65), and the combined width of [24] and [39] is approximately that of insulator [36], giving a range between 5-14 mm. The figure is not taken to be completely to scale, however, it does give a rough idea of size proportions. The shown metal strip [39] and collector [24] a similar thickness to the insulator layer. Given the teaching of the combination of [39] and [24] would be less than 14 mm, the adjacent insulator would proportionally have a thickness about that much, thus obviating a thickness 20mm or less for said insulator.

As to (c), although the insulator's thermal conductivity is not disclosed, Morrow et al. mentions that the use of "ZAL-45 alumina insulation" material (column 5; lines 41-44). This insulator's thermal conductivities can be found in the Characteristics & Properties section of evidentiary piece "ZIRCAR Ceramics: ZAL-45 & ZAL-45AA" and can be seen to be dependent on the environmental temperature. Therefore, if the running temperature of the fuel cell stack is lower than 250°C, than the thermal

conductivity can be expected to be lower than 0.16 W/mK. Morrow et al.'s fuel cell stack seems to be drawn most specifically to a proton exchange membrane (PEM) fuel cell, as the improvement is referenced to it in the Background of the Invention (col. 2, lines 15-50). It is evidenced by the Handbook of Fuel Cells that a PEM stack runs at 80°C (p 1-32, para 2, lines 7-10). The thermal conductivity would inherently be lower than .16 W/mK, however, the exact number cannot be extrapolated. However, it the value would be close to that of the claimed 0.100 W/mK or less. It has been held that when the difference between a claimed invention and the prior art is the range or value of a particular variable, then a prima facie rejection is properly established when the difference in the range or value is minor. Titanium Metals Corp. of Am. v. Banner, 778 F.2d 775, 783, 227 USPQ 773, 779 (Fed. Cir. 1985). Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). Claims that differ from the prior art only by slightly different (non-overlapping) ranges are prima facie obvious without a showing that the claimed range achieves unexpected results relative to the prior art. (In re Woodruff, 16 USPQ2d 1935,1937 (Fed. Cir. 1990))

As to (d), Morrow et al. does not specifically mention the warming of the cell. However, if the fuel cell structure above is taught or obviated by Morrow et al., it would operate in such a method that would inherently warm up the cell as required by claim 25 of the instant application.

Regarding claims 2-3, Morrow et al. does not specifically mention that the sensible heat of the current collector is no greater than 50% greater than the sensible heat of the end cell (as required by claim 2), more specifically no greater than 25% greater than the sensible heat of the end cell (as required by claim 3). However, Morrow et al. teaches the fact that the thickness of the metal current collector with certain desired properties is dependant on the material it is made of (column 5, lines 56-61). Sensible heat is one of these inherent properties of a material, given a specific thickness. Therefore, a copper metal strip [39] acting as a current collector plate would inherently have the property where the sensible heat of the current collector is no greater than 50% greater than the sensible heat of the end cell (as applied to claim 2), more specifically no greater than 25% greater than the sensible heat of the end cell (as applied to claim 3).

As to claim 8, insulator [36] can be viewed in comparison to the combination metal layer [39] and collector [24]. Although the figure is not drawn to scale, it is reasonable to say that insulator [36] would be less than the claimed 10 mm. This conclusion can be drawn since the metal layer [39] has been defined to be less than 2 mm thick (col. 5, lines 55-62) and the current collector [24] is defined to be 3-12 mm (col. 4, lines 60-65), and the combined width of [24] and [39] is approximately that of insulator [36], giving a range between 5-14 mm. Using the figure for a rough idea of size proportions. The shown metal strip [39] and collector [24] a similar thickness to the insulator layer. Given the teaching of the combination of [39] and [24] would be between 5-14 mm, thus if not teaching the 10 mm or less by inclusion, at least obviating

the claimed range of 10 mm or less, as it has been held that when the difference between a claimed invention and the prior art is the range or value of a particular variable, then a prima facie rejection is properly established when the difference in the range or value is minor. Titanium Metals Corp. of Am. v. Banner, 778 F.2d 775, 783, 227 USPQ 773, 779 (Fed. Cir. 1985). Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969).

As to claims 9 and 10, Morrow et al. does not specifically mention that the insulator has a total heat rate of transfer across the insulator from the end cell of less than 50% generated by the end cell (as required by claim 9) and less than 25% generated by the end cell (as required by claim 10). However, the insulator has the purpose of keeping heat from transferring between the end cell and current collector, thus the heat lessened transfer would definitely be less than 100%. However effectiveness of an insulator is an inherent property of thickness and material used. As the alumina material used by Morrow et al. has fit the previously defined characteristics for the insulator, it would be inherent that the heat transfer across the insulator would be less than 50% and even 25% of the heat generated by the end cell (as applied to claims 9 and 10, respectively).

As to claim 11, Morrow et al. teaches that heavy dense metals have been used to construct the pressure plates (column 2, lines 36-38).

Regarding claim 12, Morrow et al. teaches a pressure plate that is made of an electrically non-conductive, non-metallic, fiber reinforced composite material (column 6, lines 7-10).

Regarding claim 13, Morrow et al.'s teach has a current collector, metal strip [39] that extends along the long side of the fuel cell stack that is adjacent to the pressure plate [40], where the metal strip [39] (interpreted as the current collector) is connected to conductive studs [28, 30] (see fig. 1). Another current collector [26] is connected to conductive studs [32, 34]. The conductive studs [28, 30, 32, 34] conduct the electricity (col. 5, lines 18-24). Although the thin metal strip [39] (interpreted as a current collector) is shown as being placed next to one carbon collector [24] and not the other [26], it would have been obvious to one having ordinary skill in the art at the time the invention was made to duplicate the metal strip [39] to be placed on the other side, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.,* 193 USPQ 8.

Regarding claim 14, the interpretation using the thin metal strip [39] as the current collector is applied (see claim 1 rejection). Morrow et al. teaches the use of a thin, metal layer as a current collector (column 5, lines 50-51). Foil is defined as being metal in the form of thin, flexible leafs or sheets (*The American Heritage® Dictionary of the English Language, Fourth Edition.* Houghton Mifflin Company, 2004. 28 Aug. 2006. <Dictionary.com http://dictionary.reference.com/search?q=foil>). A thin metal layer fits the definition of a foil.

As to claim 15, the interpretation using the thin metal strip [39] as the current collector is applied (see claim 1 rejection). Looking at Morrow et al.'s fig. 1, it is clear that the metal strip [39] (serving as the current collector) serves as a metal coating on insulator [36].

As to claims 17 and 18, Morrow et al. teaches a thin, conductive metal layer [39], said to be less than 2 mm thick (col. 5, lines 55-62), which can be taken that this thin metal layer can be interpreted as a current collector itself. Additionally, it is taught that more recent current collectors are thinner than previous ones (column 5, lines 56-57).

Morrow et al. does not specifically teach that the current collector is no greater than 0.50 mm thick (as required by claim 17), or more specifically that it is not greater than 0.25 mm thick (as required by claim 18). However, it has been held that when the difference between a claimed invention and the prior art is the range or value of a particular variable, then a prima facie rejection is properly established when the difference in the range or value is minor. Titanium Metals Corp. of Am. v. Banner, 778 F.2d 775, 783, 227 USPQ 773, 779 (Fed. Cir. 1985). Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). Claims that differ from the prior art only by slightly different (non-overlapping) ranges are prima facie obvious without a showing that the claimed range achieves unexpected results relative to the prior art. (In re Woodruff, 16 USPQ2d 1935,1937 (Fed. Cir. 1990))

As to claims 19-20, Morrow et al. teaches a graphite current collector [24] with a desired electrical conductivity of 25 siemens/centimeter or greater (column 4, lines 62-64). However, in one embodiment, Morrow et al. also teaches an embodiment of a current collector that includes a thin, highly conductive metal layer [39], for example copper, next to it (col. 5, lines 44-62; fig. 1). This thin, conductive metal layer [39] can be interpreted as a current collector itself. Because of the recitation of the high conductivity, it would be inherent that this metal layer [39] would have a conductivity as high, or even higher than the current collector [24]. See below calculations of resistivity to conductivity.

*Boundary of claim 19 applied:

$$
\begin{aligned}
&resistivity = \frac{1}{conductivity} \\
&at\_Claim's\_boundary: \\
&resistivity = 50\_mircro - ohm\_cm \\
&conductivity = \frac{1}{50\_micro - ohm\_cm} \\
&conductivity = \frac{1}{50 * 10^{-6}\_ohm\_cm} \\
&conductivity = 20000\_siemens / cm \geq 25\_siemens / cm
\end{aligned}
$$

*Boundary of claim 20 applied:

$$resistivity = \frac{1}{conductivity}$$
$$at\_Claim's\_boundary:$$
$$resistivity = 25\_mircro - ohm\_cm$$
$$conductivity = \frac{1}{25\_micro - ohm\_cm}$$
$$conductivity = \frac{1}{25 * 10^{-6}\_ohm\_cm}$$
$$conductivity = 40000\_siemens/cm \geq 25\_siemens/cm$$

As to claim 21, Morrow et al. teaches that the metal strip [39], serving as the current collector, is exemplified by the material copper (col. 5, lines 45-55).

As to claims 23 and 24, the recitation of loads (transportation device and stationary device, as required by claims 23 and 24, respectively), the structure of Morrow et al. can be used for such external loads.

While intended use recitations and other types of functional language cannot be entirely disregarded. However, in <u>apparatus</u>, article, and composition claims, <u>intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.</u> In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. In re Casey, 370 F.2d 576, 152 USPQ 235 (CCPA 1967); In re Otto, 312 F.2d 937, 938, 136 USPQ 458, 459 (CCPA 1963).

<u>Claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function</u>. In re Danly, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). See also MPEP § 2114.

The manner of operating the device does not differentiate an apparatus claim from the prior art. A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987)

As applied to the apparatus claims.

4. Claims 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morrow et al., ZIRCAR, and The Handbook of Fuel Cells, as applied to claim 1, in further view of "Thermal Properties of Silica Aerogels."

As to claims 4-6, Morrow et al.'s insulation material (as evidenced by ZIRCAR) teaches that the thermal conductivity of Morrow et al.'s material reasonably is held to be below 0.16 W/mK.

Morrow et al. does not teach that the thermal conductivity is no greater than 0.005 W/mK (as required by claim 4), no greater than 0.010 W/mK with a compressive strength in excess of 350 kPa (as required by claim 5), no greater than 0.005 W/mK with a compressive strength in excess of 350 kPa in a vacuum (as required by claim 6).

"Thermal Properties of Silica Aerogels" teaches that silica aerogels have very low thermal conductivity (as applied to claims 4-6), a property of low thermal conductivity can be decreased even more under vacuum (as applied to claim 6) (p1, para 001). Additionally, "Thermal Properties of Silica Aerogels" cites a particular silica aerogel that is used in a carbon composite that has a thermal conductivity that is as low as approximately 0.0042 w/mK (p3, para 004, fig. 2) (as applied to claims 4-6). Although

compressive strength is not specifically mentioned, this property is inherent to the material of the insulator, therefore the silica aerogel composite would inherently have the compressive strength of an excess of 350kPa (as required by claims 4 and 5). Additionally, it is said that the carbon addition to the silica aerogel adds mechanical strength (in addition to lowering thermal conductivity, as seen above) (p3, para 004). The motivation for using the silica aerogels composite is that silica aerogels have been found to be an environmentally friendly insulator (p1, para 001). Furthermore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the silica aerogel composite as the insulator for the fuel cell stack, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin,* 125 USPQ 416.

5. Claims 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morrow et al., ZIRCAR, Handbook of Fuel Cells (as applied to claim 22) in further view of US 2003/01244114 (Hertel et al.).

Claims 23-24 were previously rejected above, where the load was not given patentable weight. However, an alternate rejection can be made if the loads were given patentable weight.

As to claims 23-24, none of the aforementioned pieces teach the specific loads of transportation drive systems (as required by claim 23) and stationary devices (as required by claim 24).

However Hertel et al. teach that fuel cells, using PEM as example, are well-known and are commonly used to produce electrical energy to power to be used in transportation vehicles, portable power plants, and stationary power plants (as applied to claim 22-24) (para 0001-0002). The motivation for using fuel cell-generated electricity for both stationary loads and transportation vehicles is that fuel cell generated electricity is more environmentally friendly. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to use electricity generated by a fuel cell assembly stack in a power plant whose electrical energy was to be used in transportation and stationary applications in order to reduce pollution.

Response to Arguments

6. Applicant's arguments filed February 12, 2007 have been fully considered but they are not persuasive.

As to claim 1, Applicant argues that Morrow et al. does not cite the limitation of the size of current collector.

Examiner respectfully disagrees with applicant. Morrow et al. teaches a thin metal strip [39], which can act alone as a current collector, absent from the graphite current collector [24]. This interpretation is reasonable, as the structure in the instant application is the same. Take fig. 1 - the current collector [30] is a metal strip with a carbon paper cushion [44] placed next to it. The definition of current collector is merely different between the Morrow et al. teach and the instant application. As stated in the new rejection, Morrow et al. teaches that the thin metal strip [39] is less than 2 mm thick. Although it is not stated to be 1 mm or less (as required by claim 1), the

difference in the thicknesses is small and would thus be obviated by the Morrow et al. teaching.

As to claim 1, Applicant argues that Morrow et al. does not teach of the limitation of the size of current insulator.

While Morrow et al. does not explicitly define the size of the insulator, it is the Examiner's position that the full disclosure of this reference would reasonably lead one of ordinary skill in the art to employ insulators having a thickness of no greater than 20 mm. As previously stated the metal layer [39] has been defined to be less than 2 mm thick (col. 5, lines 55-62) and the current collector [24] is defined to be 3-12 mm (col. 4, lines 60-65), and the combined width of [24] and [39] is approximately that of insulator [36], giving a range between 5-14 mm. The figure is not taken to be completely to scale, however, it does give a rough idea of size proportions. The shown metal strip [39] and collector [24] a similar thickness to the insulator layer. Given the teaching of the combination of [39] and [24] would be less than 14 mm, the adjacent insulator would proportionally have a thickness about that much, thus yielding a 20mm or less thickness obvious.

As to claims 1, 22, and 25 Applicant argues that the further specification of thermal conductivity across the insulator being now greater than 0.100 W/mK removes the "ZIRCAR" reference.

Examiner respectfully disagrees with this argument. As seen by the "ZIRCAR" reference, the insulation material's thermal conductivity lessens as the operating temperature lessens. The last point given in the "ZIRCAR" reference was 0.16 W/mK at

250°C. However, the position has been made that the fuel cell that is taught by Morrow et al. runs at a much lower temperature, thus providing a lower thermal conductivity than listed. Even though extrapolation would not be an accurate measurement, Examiner's position is that the thermal conductivity would be close to the new limitations set forth by Applicant.

Applicant argues that with respect to claims 2-5, 7-10, and 16-20, that the properties of the current collectors and insulators have patentable weight.

Examiner holds the position that these properties are inherent in the materials of the prior art and there is no evidence showing otherwise.

With respect to the current collector, the thickness is similar and the material can be the same thing (p11, lines 3-10 of the spec cite copper as a material for the current collector, much like [39] of Morrow et al.). The sensible heat limitations (claims 2-3) are taken to be inherent properties of the material chosen, and thus the rejection still stands. With respect to the size of the current collector size, Morrow et al.'s recitation "less than 2 mm" (col. 5, lines 55-59) covers the size constraints of claims 17-18. Additionally, there is a numerical recitation of Morrow et al.'s current collector [24], and although it is not stated for metal strip [39], the metal strip is highly conductive and is reasonably interpreted to be similar to 25 siemans/cm or greater. This property thus reads on the constraints of claims 19-20.

With respect to the insulator, Morrow et al. does reasonably suggest a size that reasonably reads on claim 9 (see arguments above). The thermal conductivity and compressibility constraints of claims 4-5 are maintained under the fact that the property

is an inherent property of the material, the operating conditions, and thickness of the material. The same weight has been given to the heat transfer rate stated by claims 9-10. Even though Morrow et al.'s teaching does not specifically mention the rate of heat transfer, it is inherent by the nature and purpose of using an insulator. Additionally, the insulator would not transfer a heat across it that is greater than what is generated by the end cell, as it does not generate heat itself to transfer.

Thus, the structure of Morrow et al.'s fuel cell stack would still read on the aforementioned claims.

As to claim 22, Applicant argues Morrow et al. does not teach the fact that the total rate of heat transfer across the insulator from the end cell is no greater than heat generated by the end cell.

Examiner respectfully disagrees that this limitation is not covered by Morrow et al. Although not specifically stated, materials that insulators are made out of inherently absorb heat. Therefore, it is inherent that the heat transferred across the insulator would be less than that of the heat generated by the end cell. Additionally, the insulator cannot transmit more heat than is generated by the end cell, as it does not generate heat itself to transfer.

Applicant argues that the limitations discussed above are not anticipated or obviated by the prior art of record and also apply to claim 25.

Examiner respectfully refers applicant to her previous reasoning, as stated above, as clarification of her position on the issues raised through the response.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eugenia Wang whose telephone number is 571-272-4942. The examiner can normally be reached on 8 - 4:30 Mon. - Fri., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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EW

GREGG CANTELMO
PRIMARY EXAMINER

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14 MARCH 2007